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Photo by U. S. Bureau of Mines.

Coal-Mine Disasters in 1940

By MAX D. KOSSORIS

Bureau of Labor Statistics

The accident record of United States coal mines in 1940 gives those engaged in the industry very little cause for rejoicing; in fact, the situation is so grave that serious thought and relatively quick action are demanded if the coal-mining industry of this country is to avoid stigma of a national, even a world-wide, scandal because of the callousness with which the lives of its workers are being sacrificed.

—U. S. Bureau of Mines.

The loss of 276 lives in 6 major coal-mining disasters during 1940 has again focused the attention of the Nation upon the hazards to the lives and limbs of the workers engaged in mining coal. In addition to the loss of life in these 6 disasters, about 1,060 miners died in less spectacular accidents, and another hundred are expected to die as a result of injuries. No figures are as yet available for the number of nonfatal accidents during 1940, but on the basis of past experience these may be conservatively estimated at about 60,000.

This loss of life because of accidents has dramatized the need for more adequate and comprehensive safety measures than now exist on the statute books. It also indicates the need for more vigorous enforcement of existing laws.

Coal mining is a very hazardous industry. During 1939, the last year for which final figures are available from the United States Bureau of Mines, there were 81 disabling injuries for every million employee-hours worked. Except for logging, there is not a single manufacturing industry which exceeds or even closely approaches this rate. The frequency rate for sawmills, the most hazardous manufacturing industry next to logging, was only 51 in 1939. Of the other manufacturing industries, only a few had rates exceeding 30. Even construction, with a rate of 62, was less hazardous than coal mining.

What causes these accidents? Are the conditions which bring them about of such a nature that they cannot be altered so as to prevent these accidents from occurring? A good way of answering these questions is to analyze the conditions which led to the loss of 276 lives in the 6 major disasters during 1940.

The most severe of these accidents occurred on January 10, 1940, at the Bartley No. 1 mine at Bartley, W. Va. Two explosions took the lives of 91 miners. Forty-seven others were able to reach the surface safely. Because the second explosion destroyed much of the evidence concerning

the first, investigators from the United States Bureau of Mines found it very difficult to determine the cause of the initial blast. But, after examining all possible causes, they concluded that the explosion was probably caused by an electric arc or sparks from mine equipment which ignited methane gas and coal dust.

The mine, on the whole, was using equipment suited for the conditions existing in the mine, but the equipment had been permitted to lapse into substandard conditions. This was true of cables carrying electric power to machines in the mine, of contacts, switches, and connections. Some of the equipment used, however, was not permissible in a gassy mine, such as this mine was known to be.

There was evidence that men had been splicing a cable when the first explosion occurred. This was in violation of company regulations which prohibits the splicing of a cable while power was on the line and permits no one but a shot firer or foreman to do the splicing. But because there were no suitable junction boxes or connector plugs, this repair would have required cutting off the power from the entire section.

In spite of the many commendable safety practices maintained by the company, the main difficulties in this instance appear to have been (1) allowing "permissible" equipment to lapse into "unpermissible" conditions, (2) condoning unsafe practices on the part of miners, and (3) failure to provide suitable junction boxes or connector plugs.

The second disaster occurred at the Willow Grove No. 10 mine at Neffs, Ohio, and killed 72 men. Sixty-six were killed outright by an explosion, 3 died of burns, 1 died from the effect of carbon monoxide, and 2 were asphyxiated while engaged in rescue work. Twenty-two more were overcome by afterdamp, but appear to have recovered. Ninety-four others escaped unharmed.

The source of this explosion was traced to a shot of black blasting powder stemmed with fine coal and coal dust ("bug dust"). The shot ignited a cloud of coal dust, which in turn ignited coal dust raised in suspension by the initial explosion.

Investigators found the mine to be dry and dusty without any provisions for wetting down coal dust. Further, although the mine was classed as "nongassy," samples of air revealed the presence of considerable quantities of the explosive methane gas. The explosion, probably involving both dust and gas, was so violent that rescue workers had to remove thousands of tons of rock. The extensive falls of rock, however, helped to choke off the explosion and kept it from spreading further.

The deaths of 3 men and the endangering of 104 others were laid directly to the installation of haulage roads on return air. Instead of taking in air through the tunnels used for hauling coal, these tunnels were used to carry impure air out of the mine. It was necessary to change this ventilating system before rescue work could progress after the explosion.

The third disaster, killing 63 miners, occurred at the Sonman "E" mine at Sonman, Pa., on July 15. Evidence indicated that practically all of these men died from afterdamp released by the initial explosion.

The cause of the explosion was laid to the igniting of methane gas by a spark from the trolley of an electric locomotive. As in the case of the Willow Grove mine, the haulageway was used for the removal of impure air from the gassy mine. Some of the methane gas appears to have been ignited while on its way out.

That the company was fully aware of this danger was evidenced by the fact that in another mine it had reversed the ventilation method, using the haulageway for intake rather than exhaust. In the "E" mine, however, investigators of the United States Bureau of Mines found that: "The present system of mining was obviously laid out with a view to obtaining a maximum recovery of coal without making pillar falls, and apparently little consideration was given to proper and adequate ventilation."

An important aspect of this tragedy was that existing State laws and regulations, while providing for examination of abandoned areas and for the sampling and testing of air, were inadequate to meet the hazard which led to the explosion. There was nothing in these provisions which required that the ventilating system be so arranged as to use the haulageway for intake of pure air rather than as an exhaust for impure air.

An instance of complete absence of any kind of safety organizations or regulations was furnished by an explosion in the No. 2 mine of the Bates Coal Corporation at Bates, Ark. Ten men were killed—seven as a direct result of the explosion, and three from the effects of afterdamp. The immediate cause of the explosion was traced to the igniting of gas that had been exposed by a cutting machine, by an electric arc caused by shutting off the electric current from the machine,

or by the flame of a match. Matches were found in the pockets of some of the victims.

Investigators from the United States Bureau of Mines called attention to a number of serious safety violations. In their recommendations they pointed out that maximum safety demands that blasting be done only when all men except the shot firer are outside the mine; that only permissible types of cutting machines be used; that men be searched for matches and smoking material before entering the mine; and that first-aid and mine-rescue training be initiated immediately.

It is of particular significance that this was the third such disaster in this mine since November 1936. At that time an explosion took five lives. Another explosion, in May 1940, caused considerable damage, but fortunately no one was in the mine. In spite of these explosions, apparently no effective precautions were taken against a recurrence.

A second major disaster in Ohio coal mines occurred at the Nelms mine of the Ohio & Pennsylvania Coal Co., near Cadiz, Ohio, on November 29, 1940. It took 31 lives. Fortunately the explosion was restricted to one section of the mine, permitting 104 men in other sections to escape safely. Property damage was extensive. As in the case of the Bartley, W. Va., explosion, the Nelms mine was very gassy and highly mechanized. And again, in spite of considerable safety precautions, "permissible" equipment had been allowed to lapse into a "nonpermissible" condition.

A direct violation of the prohibition against open flames in a mine caused an explosion at the No. 4 mine of the Raleigh Coal and Coke Co., Raleigh, W. Va. Nine men were killed. Because the coal mined was of a low-volatile type, and because the mine was considered nongassy, smoking was a general practice at this mine. The explosion was set off when an engineer attempted to smoke and ignited accumulated gas.

An analysis of available data shows that while the number of nonfatal injuries per million manhours worked in coal mines has been decreasing during the last 10 years the fatality rate has not been reduced. The causes of the six major disasters during 1940 point to one possible explanation for the persistence of the high fatality rate. Nonfatal injuries are being reduced through better safety training and safety precautions on the job. But major disasters appear to be more the result of the lack of engineering provisions which fall properly within the scope of management and are outside the individual miner's control.

Two of the disasters indicate clearly the inadequacy or lack of State regulations. Others suggest that mines were not adequately inspected. If they had been, the nonpermissible character of machinery and the failure to remove gasses and dust adequately should have been attended to. Failure of proper inspection on the part of State officials, in turn, may be laid to such causes as inadequate funds, inadequate authority, and the selection of inspectors from personnel whose qualifications are political rather than practical.

Pending Legislation.—Attempts have been made to provide for Federal legislation which would give the United States Bureau of Mines the necessary authority and funds to put into practice a system of regular and effective mine inspections. During the last session of Congress, the Neely-Keller mine inspection bill passed the Senate but did not come to a vote in the House of Representatives. Several mine inspection bills have already been introduced in the new Congress which convened in January 1941. One of these bills, which has the approval of the United Mine Workers of America, provides for:

1. Regular annual inspections by the United States Bureau of Mines, in cooperation with State inspectors, of mines whose product enters into interstate commerce.

2. More frequent inspection of mines upon the occurrence of an accident resulting in injury or loss of life or at the request of a majority of underground workers or their authorized representative.

3. The publication by the United States Bureau of Mines of regular reports or studies to be submitted to Congress with recommendations for necessary legislation based upon information obtained on accident hazards in coal mines.

Whether by Federal legislation or by other equally effective means, the need to stop the wholesale killing of miners and the destruction of mine property through explosions or other mine disasters has become very urgent. The process of mechanization of coal-mine operations has apparently raised new problems which are not being adequately met in a considerable number of coal-mining areas. Industrial processes change rapidly and safety can be obtained only through constant, vigilant attention not only to hazards already known but also to those anticipated with the introduction of technological changes.

Production, Employment, and Pay Rolls in 1940

The statistics on industrial production are taken from reports of the Federal Reserve Board and the Department of Commerce. Employment and pay rolls, except for class I steam railroads, are based on Bureau of Labor Statistics figures adjusted to latest census data.

Large foreign orders for armaments and a greatly expanded domestic defense program raised industrial production in the United States to unprecedented levels by the end of 1940. During the first 4 months of the year, output of factories and mines declined from the peak established late in 1939. In May, however, production resumed an upward trend, and by December it reached the highest point in the history of the country.

The greatest increases in output were recorded in durable-goods manufacturing. Among this group of industries the largest advances occurred in steel, machine tools and machinery, aircraft, shipbuilding, and other industries most directly affected by war and defense orders. Automobile assemblies also rose markedly in 1940, and smaller gains were registered in the production of cement, lumber, and glass. Averaged over the year as a whole, production of durable goods last year was 25 percent greater than in 1939 and nearly 11 percent greater than in 1937.

Gains in output were also made by industries producing nondurable goods. Substantial increases were recorded in cotton textiles, chemicals, rubber, and paper and paper products. A slightly higher level of production was also reported for manufactured foods, petroleum, refining, and tobacco. For all nondurable-goods industries combined, the 1940 output averaged about 5 percent larger than in 1939 and nearly 7 percent larger than in 1937.

Among minerals the largest increase in production over the previous year was recorded in copper. It averaged about 22 percent. More crude petroleum and bituminous coal were extracted, but output of anthracite declined. Production of gold and silver was larger than in 1939.

Building construction, as measured by the value of permits issued, advanced 23 percent in 1940. More new one-family dwelling units were built in 1940 than in any year since 1928.

The widespread gains in manufacturing, mining, and construction were accompanied by greater activity in trade and commerce. Department store sales, for example, were 7 percent larger than in 1939, and railroad freight-car loadings likewise increased by 7 percent.

Preliminary estimates of the national income in 1940 indicate that total income payments during the year approximated 74.3 billion dollars. This was an increase of 6 percent over the 70.1 billion dollars paid out in 1939. Although in dollars and cents the total national income in 1940 was about 8 billion dollars smaller than in 1929, the lower level of prices which prevailed in 1940 made the per capita real income in 1940 about as large as it was in 1929.

Nonagricultural Employment.—Slightly more than 1½ million additional workers had jobs in industries other than agriculture at the end of 1940 than in December 1939. This increase does not include the nearly 900,000 men enrolled in the military and naval forces of the country at the end of the year.

Averaged over the 12 months, nonagricultural employment for the year was estimated at approximately 35,450,000. Of this number 10,730,000 were employed in manufacturing and mining, 6,260,000 in trade, 4,170,000 in service, amusements, and financial establishments, such as banks and insurance companies, 3,800,000 in civil branches of Federal, State, and local Government agencies, 3,020,000 in transportation and public utilities and 1,325,000 in construction. The balance of slightly more than 6,000,000 persons was made up of proprietors, self-employed persons, casual workers, domestics, and others.

For the year as a whole, nonagricultural employment in 1940 averaged 3 percent higher than in the preceding year. It was about as large as the average for 1937 but was slightly smaller than the average for 1929.

Manufacturing Industries.—Gains in factory employment for the most part closely paralleled the increases in industrial production. The largest advance occurred in the aircraft industry, which employed approximately 130,000 workers in December 1940, as against 59,000 in December 1939. Other particularly large increases in employment were 75 percent in engines and turbines, 58 percent in shipbuilding, 44 percent in machine tools, and 36 percent in the manufacture of explosives.

Factory employment in December 1940 totaled approximately 9,170,000 and was greater than for any other month since January 1919, the earliest date for which the Bureau of Labor Statistics has records of employment. The average employment for the 12 months of 1940 in manufacturing was 8,480,000, and was larger than for any previous year except 1937, when the average reached 8,570,000.

The largest increase in employment last year was recorded by the durable-goods group. It amounted to 16 percent. In the nondurable-goods group of industries employment averaged about 1 percent higher than in 1939.

Weekly pay rolls in a number of industries advanced more rapidly than employment. This was primarily due to such factors as greater regularity of full-time employment and overtime pay. Last year's average pay roll for all manfacturing industries combined was approximately $25,000,000 per week larger than in 1939. It was larger than for any year since 1929.

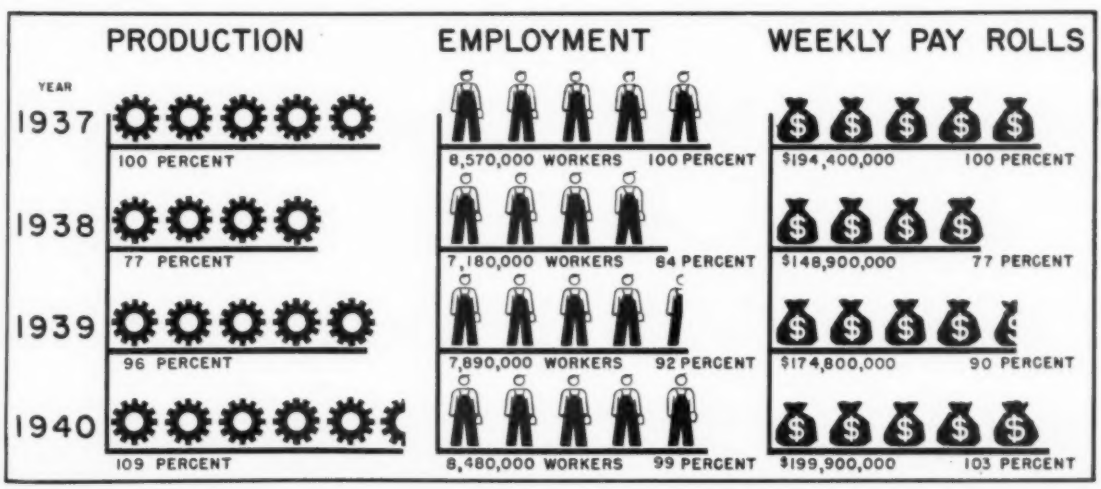
Pay rolls of durable-goods industries rose 25 percent in 1940 and with the exception of 1929 were the highest on record. In the nondurable-goods industries total weekly wage payments in 1940 averaged about 4 percent larger than in 1939. They were at approximately the same level as in 1937 and higher than in any year since 1929.

Nonmanufacturing Industries.—Employment in most of the large nonmanufacturing industries averaged slightly higher than in 1939. In building and construction the gain was quite pronounced, and in December 1940 approximately 450,000 more workers had jobs in this industry than at the end of 1939. This was a gain of about 40 percent. Employment in metal mining and in bituminous-coal mining, averaged over the 12 months of 1940, was slightly more than 10 percent larger than in 1939.

Most nonmanufacturing industries also registered higher average weekly pay rolls during the year. Gains of 10 percent or more were recorded in metal mining and bituminous-coal mining. However, in anthracite mining and crude-petroleum producing, the average weekly pay roll was slightly smaller in 1940 than in the preceding year.

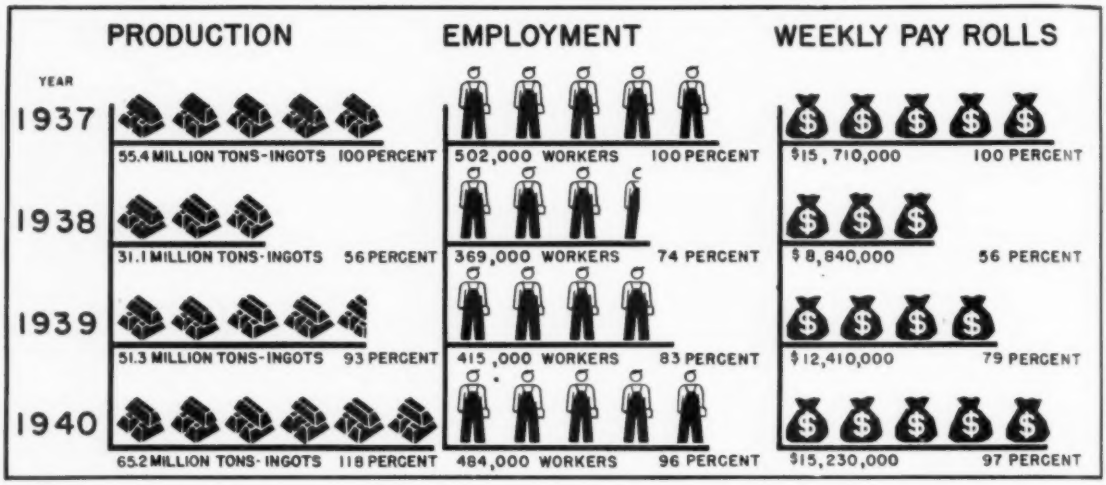
Manufacturing Industries

Output of manufacturing industries as shown by the Federal Reserve Board rose nearly 15 percent in 1940 and was 41 percent larger than in 1938. It was also 9 percent above the former peak of factory production established in 1937. Employment and weekly pay rolls in manufacturing industries also increased appreciably last year. Although average employment in 1940 was still somewhat below 1937, weekly pay rolls exceeded the average for 1937. Records of the Bureau of Labor Statistics indicate that for every 1,000 factory workers with jobs in 1937, manufacturing industries employed 990 in 1940, as against 920 in the preceding year and 840 in 1938. For every $1,000 disbursed in wages in 1937, factories paid out $1,030 last year, compared with $900 in 1939 and $770 in 1938.



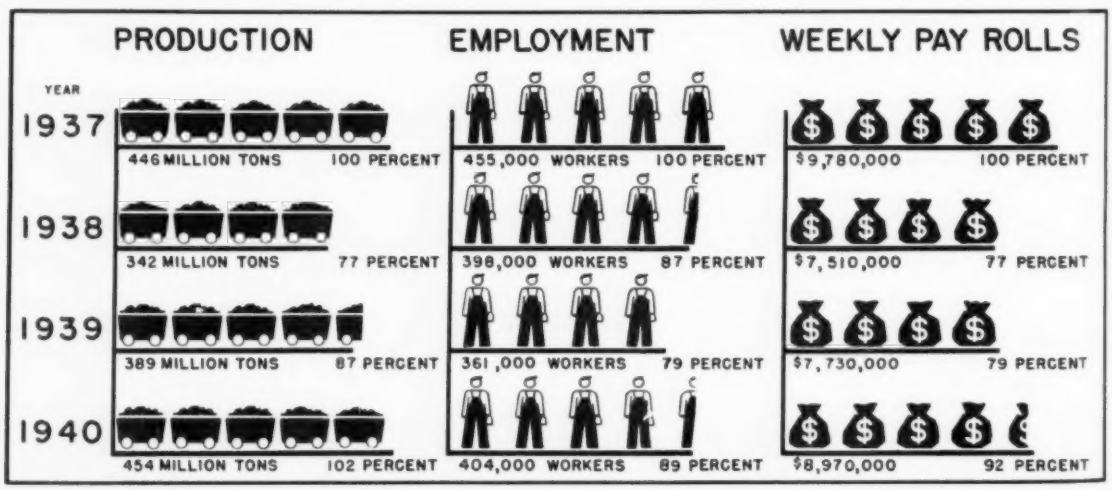
Steel

More tons of steel ingots were produced in 1940 than in any other year in the history of the United States. Total output of slightly more than 65 million tons was 27 percent larger than in 1939, and more than twice as large as in 1938. Employment in blast furnaces, steel works, and rolling mills likewise registered a sharp increase last year. Averaged over the 12-month period, employment rose 16 percent from the 1939 average. Pay rolls in 1940 rose 23 percent and were about 70 percent larger than in 1938. However, both employment and weekly pay rolls in blast furnaces and rolling mills averaged slightly lower in 1940 than in 1937.



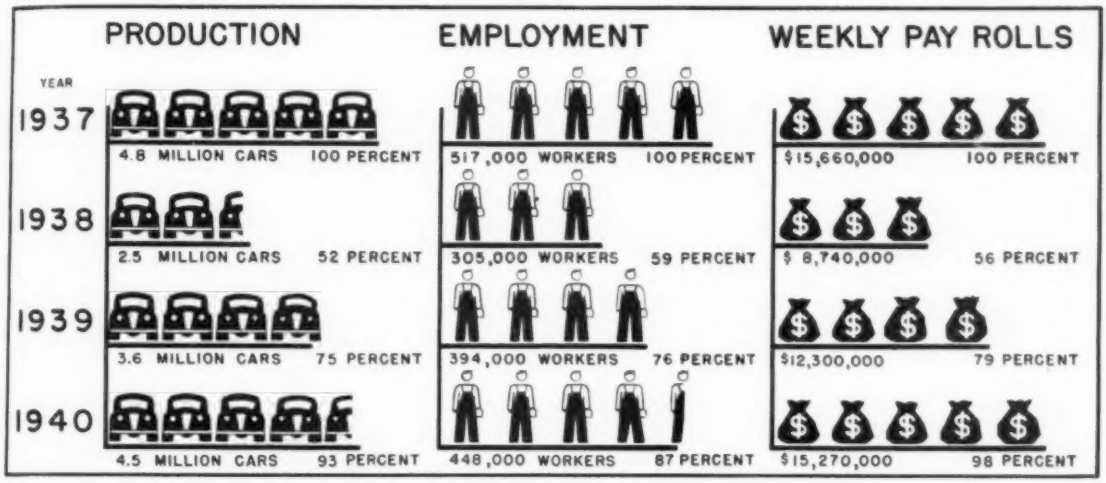
Bituminous Coal

More bituminous coal was mined in 1940 than in any year during the last decade. Total production of approximately 454 million tons was 17 percent higher than in 1939 and about one-third larger than the output in 1938. It was also slightly larger than in 1937. The number of mine workers employed in bituminous coal mines advanced nearly 12 percent, and weekly pay rolls rose 16 percent. Both employment and pay rolls were higher last year than in 1938. However, employment still averaged about 10 percent smaller and weekly wage payments averaged 8 percent less than in 1937.



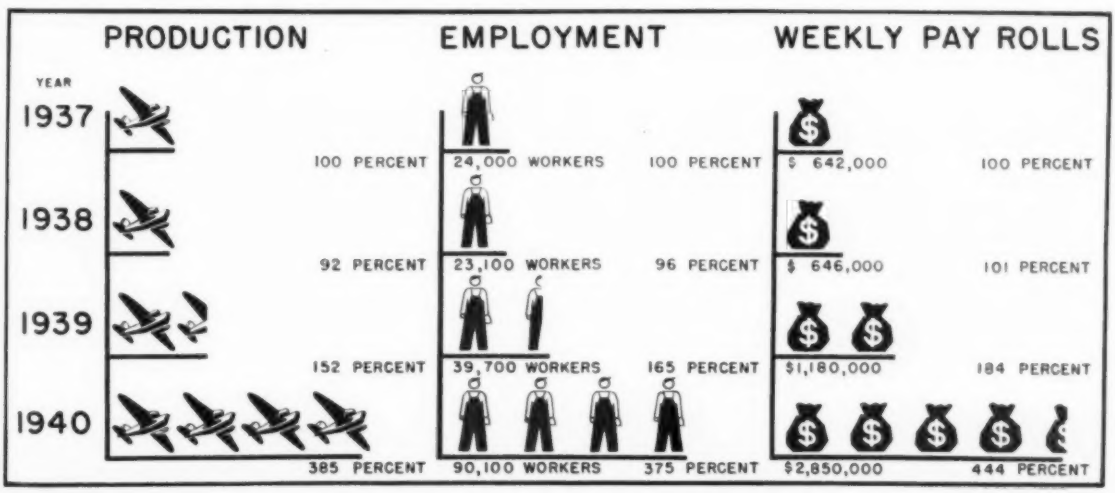
Automobiles

Nearly as many passenger cars and trucks were assembled last year as in 1937. The total output of 4,500,000 cars and trucks exceeded by approximately 900,000 the output of the preceding year and by 2,000,000 that of 1938. Average employment in the automobile industry increased about 14 percent in 1940. It was 47 percent larger than the average for 1938, but 13 percent below the level of 1937, when slightly more than half a million workers were employed in the industry. Pay-roll disbursements to automobile workers in 1940 were, on the average, nearly as large as in 1937. They were substantially higher than the average weekly pay roll reported for 1939 and for 1938.



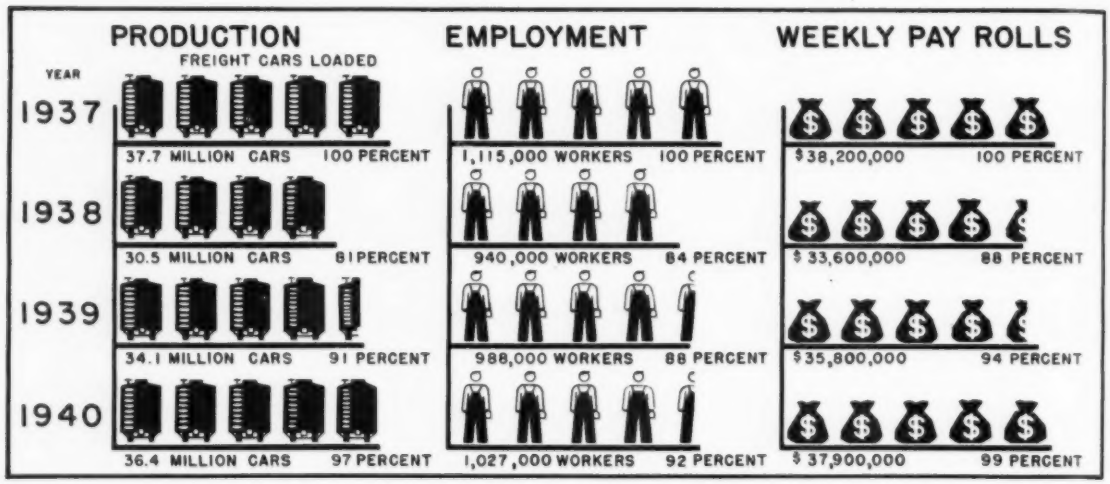
Aircraft

Production of airplanes and airplane engines and parts increased tremendously in the last 2 years. Total output of the aircraft industry in 1940 was two and one-half times as large as in 1939, and four times as large as in 1938. Employment, on the average, kept pace with the rapid rise in output, and averaged, over the 12 months, approximately 50,000 additional workers last year were employed in the air-craft industry. Weekly pay rolls have increased even more rapidly than employment, due principally to a greater degree of full-time work, overtime, and increased hourly rates of pay. Total weekly wage payments in 1940 averaged nearly two and one-half times as large as in 1939 and more than four times as large as in 1937 and in 1938.



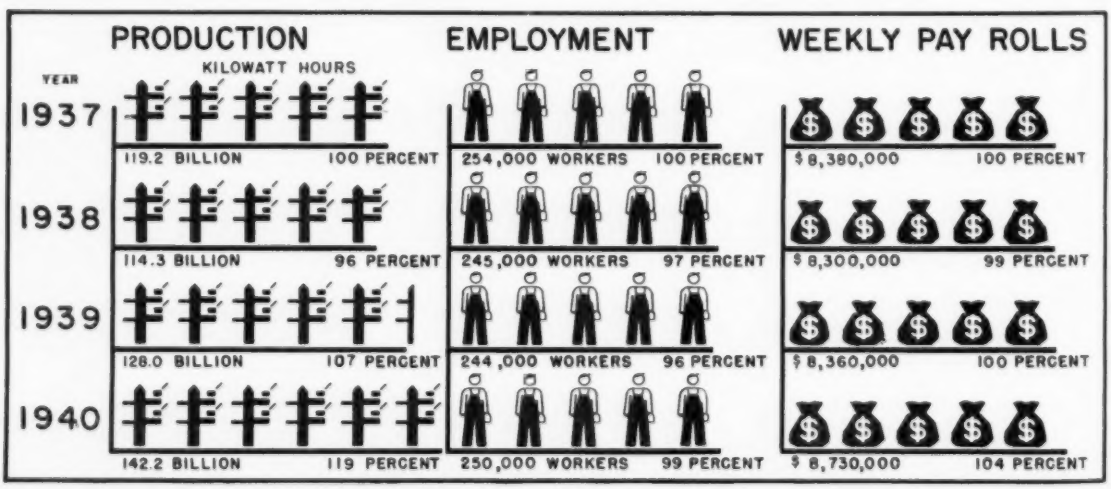
Class I Railroads

Freight-car loadings of class I railroads increased nearly 7 percent in 1940. The number of freight-cars loaded in 1940 was 19 percent greater than 1938, but was 3 percent below the 37.7 million cars loaded in 1937. The average number of workers employed by class I railroads again crossed the 1 million mark last year, but fell 8 percent short of average employment in 1937. Total compensation of railroad employees, averaged on a weekly basis, was almost as large as in 1937. It was 6 percent higher than in 1939 and nearly 13 percent higher than the 1938 pay roll for the industry averaged over the 52 weeks of operation during the year.



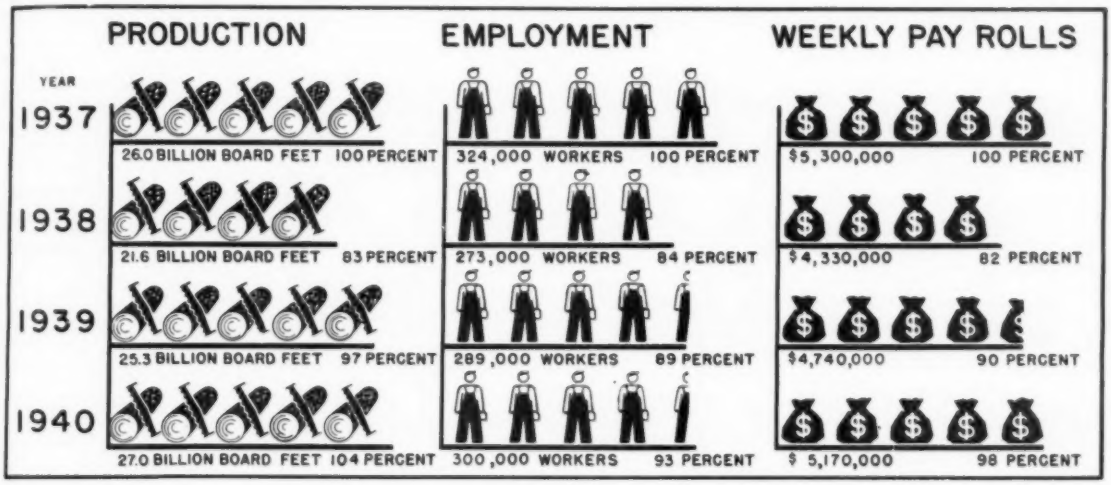
Electric Light and Power

Output of electric energy for public use rose to a new high peak in 1940. Last year's production of electric power was 11 percent greater than in 1939 and 19 percent above 1937. Average employment in the industry, on the other hand, has not varied significantly in the last 4 years. For every 1,000 workers employed in the electric light and power establishments in 1937, 990 workers had jobs in the industry in 1940 as against 960 in 1939 and 970 in 1938. For every $1,000 disbursed in weekly wages in 1937, the electric light and power industry paid out $1,040 last year, compared with $1,000 in 1939 and $990 in 1938.



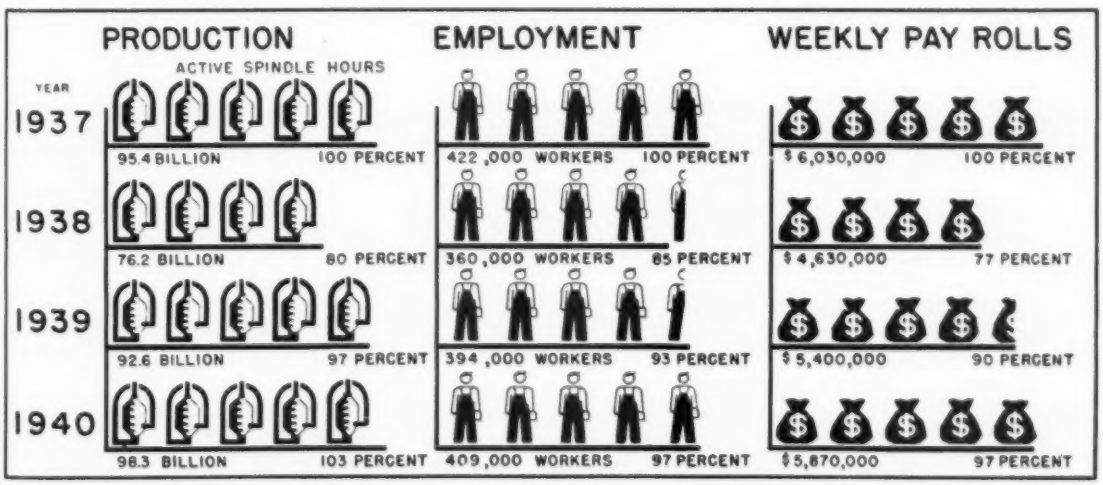
Lumber

Widespread gains in building activity during 1940 raised the production of lumber to the highest level in recent years. The approximately 27 billion board feet of lumber produced last year represented a gain of 7 percent over 1939 and was also slightly higher than the 1937 output. Employment in logging camps and sawmills advanced 4 percent. It was about 10 percent higher than 1938, but remained substantially below the average employment of 1937. The increase in weekly pay rolls in 1940 was more pronounced. Averaged over the 12 months the 1940 pay roll came within 2 percent of the industry's average for 1937.



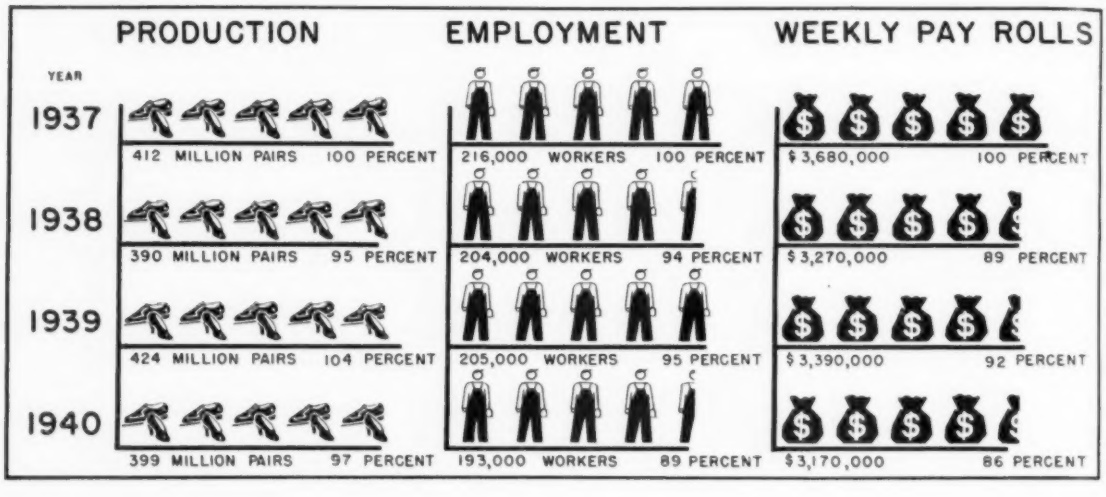
Cotton Textiles

After declining sharply in 1938, output of cotton textiles (measured by the number of hours cotton spindles were in operation) rose markedly in 1939 and 1940. Last year's rate of activity exceeded that of 1937 and was one of the highest on record. Employment and weekly pay rolls in cotton-goods manufacturing have likewise advanced substantially since 1938. Averaged over the year, the number of factory workers employed in cotton-goods establishments in 1940 again exceeded 400,000, and the industry's pay roll approached the $6,000,000 a week level of 1937.



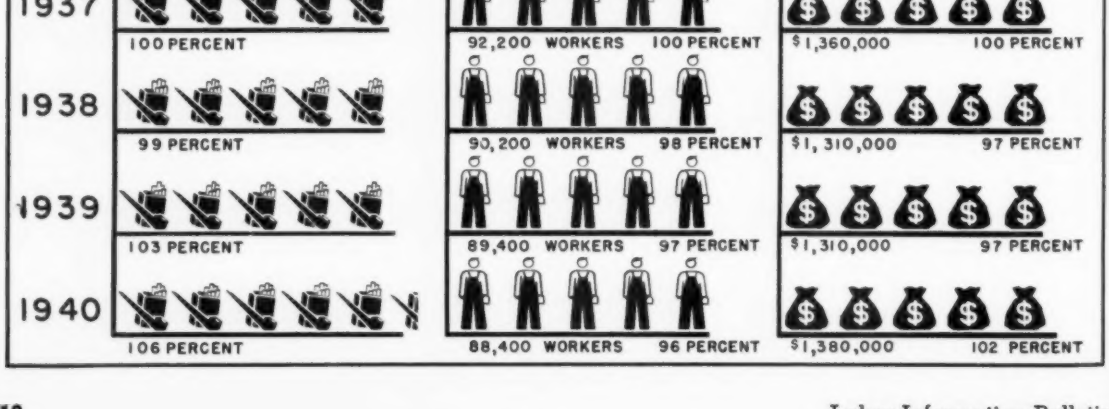
Boots and Shoes

Production of boots, shoes, and slippers declined 6 percent in 1940 from the high level of the preceding year. Total output of the industry was slightly larger than in 1938 but 3 percent smaller than in 1937. The average number of wage earners employed in the production of boots, shoes, and slippers declined by 12,000, or 6 percent. Total weekly wage payments to boot and shoe workers also averaged 6 percent smaller than in 1939. Both employment and weekly wage disbursements for the industry as a whole last year averaged substantially below 1937. Employment was 11 percent and pay rolls 14 percent lower than in that year.



Tobacco Products

Total production of cigars and cigarettes and other manufactured tobacco products continued to increase last year. Output was 7 percent larger than in 1938 and about 6 percent larger than in 1937. The number of factory workers employed in tobacco-manufacturing establishments has shown a small but steady decrease in recent years, and in 1940 average employment was about 4 percent smaller than in 1937. Aggregate weekly pay rolls, on the other hand, rose about 5 percent last year. They exceeded by 2 percent the average weekly wage disbursements to workers employed in the tobacco industry in 1937.



Rate of Operations in Defense Industries

MORRIS LEVINE

Bureau of Labor Statistics

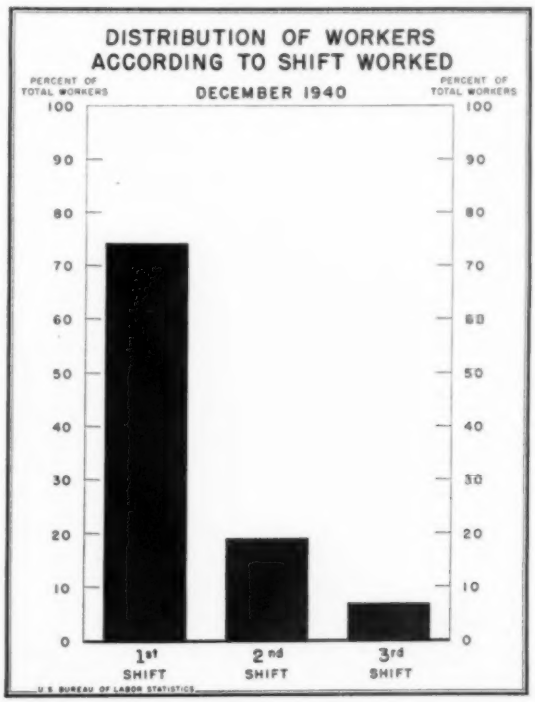
Nearly half of a group of 394 large establishments in 11 key defense industries operated on a 6- or 7-day week in mid-December, according to a Bureau of Labor Statistics survey.[1] Many of the 394 plants did not, however, utilize in full their capacity to produce the maximum amount of materials per day. This was indicated by the fact that 74 percent of the approximately 479,000 wage earners covered by the survey were employed on the first or day shift, and that work on the second and third shifts was in the majority of cases confined to making possible smooth and uninterrupted operations during the first shift and in making necessary plant repairs. Overtime, on the other hand, was widespread, and three out of every five employees covered averaged 9 hours of overtime work per week.

Length of Workweek.—During the week covered by the study, 142 of the 394 plants reported a 5-day workweek, 68 were on a 5½-day schedule, 116 were on a 6-day schedule, and 68 establishments operated on a 7-day per week basis. In several States a number of firms declared that laws forbidding work on Sunday prevented them from adopting a 7-day schedule of operation.

The 5-day week was most prevalent in the electrical-machinery industry and in shipbuilding. Over half of the plants in these two industries maintained this schedule. In the machine-tool and machine-tool accessories industries the 5½- and 6-day week prevailed in the majority of establishments. No plant in these two industries reported a 7-day production schedule. However, 6 shipyards, 11 electrical-machinery plants, 9 brass, bronze, and copper establishments, and several aluminum plants reported a 7-day workweek. Due to the nature of their operations, all but 2 of the 39 smelting and refining plants surveyed also reported continuous work on a 7-day basis.

Approximately 175,000 workers, or 36.5 percent of the nearly 479,000 wage earners covered by the survey, were employed in plants maintaining a 5-day week. Slightly fewer workers (164,700) were employed in plants operating 6 days. About 72,300 wage earners were on the pay rolls of firms operating 5½ days, and 66,800 worked in establishments operating on a 7-day week.

Number of Shifts.—The great majority of establishments operated on more than one shift per day. Of the 394 plants surveyed, 226 reported 3-shift operations, 114 reported 2 shifts, and 54 confined their production to a single shift. However, in most cases the second and third shifts were apparently limited to operations in "bottleneck" departments and to necessary maintenance and repair work. This is shown by the distribution of employees, which revealed that 74 percent of the workers were employed on first-shift operations, 19 percent worked on the second shift, and 7 percent were employed on the third shift.



[1] *The 11 industries included in the Bureau of Labor Statistics study for the Advisory Commission to the Council of National Defense were: Machine tools; machine-tool accessories; shipbuilding; electrical machinery, apparatus, and supplies; brass, bronze, and copper products; aluminum manufactures; smelting and refining; explosives, engines (other than aircraft); firearms; and ammunition.*

Second- and third-shift work was most common in establishments manufacturing brass, bronze, and copper products. Thirty-seven percent of all the workers in the plants covered in this industry were so employed. Between one-fourth and one-third of the total number of workers in aluminum manufactures, explosives, and smelting and refining were employed on the second and third shift. The smallest proportion of wage earners employed on the second and third shift was reported in shipyards, where about one out of every five wage earners worked on the second or third shift.

Overtime.—Work in excess of the regular daily hours was prevalent throughout the industries surveyed. More than 2½ million hours of overtime were worked by approximately 280,000 wage earners during the week covered in December.

In the machine-tool industry, where two-shift production schedules were common, the extensive use of overtime kept many of the plants running nearly 24 hours a day, and more than 90 percent of the employees in this important defense industry worked extra hours during the week. The average amount of overtime worked by employees in the various plants ranged from slightly more than 4 to nearly 22 hours, with an average of slightly more than 11 hours during the week covered by the survey. Two other industries—shipbuilding and firearms—also reported average weekly overtime of more than 11 hours per worker. In the remaining industries the amount of overtime work performed averaged between 10 and 11 hours per week in machine-tool accessories and engines (other than aircraft); from 6 to 9 hours in brass, bronze, and copper products, aluminum manufactures, electrical machinery, and ammunition; and slightly less than 5 hours per week in explosives and smelting and refining.

Less than 10 percent of the establishments included in the survey reported no overtime worked during the week. More than half of the wage earners in these plants were employed in factories producing electrical machinery, apparatus, and supplies.

Earnings in Defense Industries

With the key defense industries operating on overtime schedules, average hourly earnings for all manufacturing industries in December reached the highest rate recorded since the Bureau of Labor Statistics began the computation of hourly earnings in 1932.

Higher hourly earnings, a longer workweek, and overtime compensation raised the weekly earnings of the workers employed in many defense industries considerably above their levels of 6 months or a year ago. In shipbuilding, for example, average weekly earnings advanced 20 percent between December 1939 and December 1940. Increases in average weekly earnings of more than 10 percent over the same period were also recorded in electrical machinery, and apparatus, engines and turbines, brass, bronze, and copper products, aircraft, and explosives.

The highest weekly earnings reported in December 1940 were for the machine-tool industry. Workers in this industry earned on the average $39.55 per week. Workers in shipbuilding yards averaged $39.10.

Average hours and earnings in selected defense industries, December 1940

Industry	Weekly earnings	Hourly earnings	Weekly hours
Machine tools	$39.55	$0.78	50½
Shipbuilding	39.10	.90½	43
Engines, turbines, etc	38.15	.83½	45½
Explosives	36.85	.89½	41
Brass, bronze, and copper products	35.75	.80½	44½
Blast furnaces, steel works, etc	34.65	.86	40½
Foundry and machine-shop products	32.85	.75½	43½
Electrical machinery, etc	32.60	.76½	43
Aircraft	32.45	.75½	44½
Aluminum manufactures	30.90	.73½	42
Smelting and refining—copper, lead, and zinc	29.90	.74½	40

The longest workweek in the group of selected defense industries in December 1940 was also recorded in the machine-tool industry. It averaged 50½ hours. During the same month, the average weekly working time was 45½ hours in engines and turbines, 44½ hours in aircraft, and brass, bronze, and copper products, and 43½ hours in foundries and machine shops.

The largest increase in weekly hours over the year interval, December 1939 to December 1940, was reported in shipbuilding. It averaged 13 percent. Other industries with increases of 5 percent or more in the average weekly working time over the year include electrical machinery and apparatus, engines and turbines, machine tools, aircraft, and brass, bronze, and copper products.

Business and Economic Conditions in January 1941

National Income.—Preliminary estimates by the Department of Commerce indicate that January income payments totaled approximately 6.5 billion dollars, or nearly 7 percent larger than the income payments for January 1940.

Farm Income.—The total cash income of farmers, including Government payments, aggregated $750,000,000 in January, according to the Department of Agriculture. This compares with $842,000,000 in December and $743,000,000 in January of last year.

Automobiles.—More passenger cars and trucks were assembled in January than in any month since May 1937. Total output of 500,900 cars and trucks was 17,300 larger than in December and 68,600 larger than in January a year ago.

Bituminous Coal.—About 43,900,000 tons of bituminous coal were mined in January, compared with 41,400,000 tons in the preceding month and 45,000,000 tons in January 1940.

Building Construction.—Reports from 2,227 cities indicate that the value of building permits issued in these cities in January totaled $178,200,000, as against $270,150,000 in December 1940 and $120,300,000 in January of last year.

Electric Power.—Output of electric power in January totaled 13,300 million kilowatt-hours. This was an increase of 127 million kilowatt-hours over December and of 1,300 million kilowatt-hours compared with January of last year.

Railroad Freight-Car Loadings.—Class I railroads hauled on the average 685,000 cars of freight per week in January. This compares with 680,100 cars per week in December and 639,400 cars per week in January 1940.

Steel.—Production of steel ingots continued to rise in January, with output for the month totaling 6,940,000 tons. In December 6,500,000 tons of ingots were produced and in January 1940 output totaled about 5,700,000 tons.

Trend of Industrial Production

Further increases in activity in industries manufacturing machinery, aircraft, ships, and other important defense materials were recorded in January. Output of lumber, automobiles, cotton textiles, and shoes also continued above their normal winter levels. Freight-car loadings, which usually decline in January, showed little change this year.

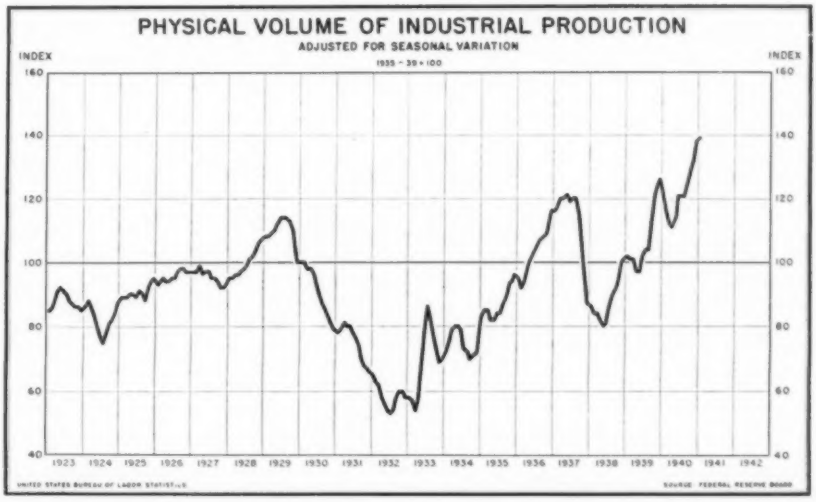
Total output of factories and mines in the United States was slightly higher than in December, establishing for the fourth successive month a new high record of industrial production. January output was also 14 percent greater than in the same month of 1940 and 39 percent greater than average output for the 5 years 1935–39.

Industrial Production
Adjusted Index

1935–39=100

1941	
January	[1] 139
1940	
December	138
November	132
October	129
September	125
August	121
July	121
June	121
May	115
April	111
March	113
February	116
January	122

[1] *Preliminary.*



Employment and Pay Rolls in January 1941

Nonagricultural employment in January declined by approximately 960,000. A substantial portion of this reduction, aggregating 650,000 employees, was in retail stores, which laid off the large number of extra workers hired to meet the heavy volume of the Christmas holiday trade. Other large seasonal decreases in employment were reported in building contruction, mining, transportation and public utilities, and finance and service establishments.

Factory employment, following the seasonal pattern, was also smaller than in the preceding month. The decline was, however, considerably smaller than in most previous years, and 74 of the 157 manufacturing industries regularly surveyed by the Bureau of Labor Statistics reported increases in the number of workers on their pay rolls. Most of these industries were directly or indirectly affected by defense orders.

Employment advanced 12,000 in foundries and machine shops, 9,200 in electrical machinery and in shipbuilding, 7,300 in aircraft, and 6,900 in steel. Smaller gains were registered in such other important defense industries as engines, machine tools, ammunition, and aluminum manufactures.

More workers had jobs in nonagricultural industries in January 1941 than in January of any other year on record. The estimated total nonagricultural employment of 36,340,000 was 1,870,000 larger than in January 1940. Outstanding gains over the year interval were the addition of 780,000 workers in manufacturing and 600,000 workers in construction.

DURABLE-GOODS INDUSTRIES

Employment.—Approximately 17,400 workers were added to the pay rolls of the durable-goods groups of manufacturing industries in January. Gains in employment over the month interval of 33,000 in machinery manufacturing and 17,100 in transportation equipment combined with a smaller increase in iron and steel were sufficient to offset reductions in employment in the remaining groups.

Nearly 700,000 more workers had jobs in durable-goods manufacturing in January 1941 than in the corresponding month of last year. All durable-goods groups reported increased employment over the 12-month interval, with the largest gains aggregating 241,100 in machinery manufacturing and 200,400 in transportation equipment.

Estimated employment and pay rolls in manufacturing industries

[January 1941, December 1940, and January 1940]

Industry	Number of workers employed			Amount of weekly pay roll		
	January 1941 [1]	December 1940 [2]	January 1940	January 1941 [1]	December 1940 [2]	January 1940
All industries	**9,096,100**	**9,170,300**	**8,287,800**	**$227,266,000**	**$232,207,000**	**$189,359,000**
Durable-goods groups [3]	*4,546,000*	*4,528,000*	*3,854,900*	*130,857,000*	*131,884,000*	*99,503,000*
Iron and steel	1,089,600	1,084,700	966,200	33,266,000	33,871,000	27,013,000
Machinery	1,236,700	1,203,700	995,600	39,847,000	38,801,000	28,375,000
Transportation equipment	857,900	840,800	657,500	29,335,000	29,076,000	20,621,000
Nonferrous metals	326,700	326,900	273,800	9,569,000	9,820,000	7,135,000
Lumber	646,000	670,400	612,600	12,227,000	13,084,000	10,769,000
Stone, clay, glass	298,100	311,500	272,200	6,992,000	7,614,000	5,936,000
Nondurable-goods groups	*4,550,100*	*4,641,700*	*4,432,900*	*96,409,000*	*100,323,000*	*89,856,000*
Textiles	1,730,100	1,743,600	1,686,200	29,965,000	30,927,000	27,716,000
Leather	302,700	293,200	315,100	5,813,000	5,482,000	5,752,000
Food	804,800	866,400	794,400	18,191,000	20,088,000	17,754,000
Tobacco	83,300	90,800	81,700	1,311,000	1,500,000	1,177,000
Paper and printing	620,000	636,700	611,300	17,102,000	17,947,000	16,351,000
Chemicals	416,900	416,000	401,100	11,738,000	11,932,000	10,859,000
Rubber	132,800	130,900	120,900	3,870,000	3,853,000	3,262,000
Unclassified	459,500	464,100	422,200	8,419,000	8,594,000	6,985,000

[1] *Preliminary.* [2] *Revised.*

[3] *Adjusted to actual levels shown by 1939 Census of Manufactures. Due to overlapping, the figures obtained by adding the separate group totals are somewhat larger.*

Weekly Pay Rolls.—Despite increased employment, weekly pay rolls for all durable-goods groups combined were about $1,030,000 smaller in January. The machinery manufacturing and transportation equipment industries were the only groups to report higher weekly pay rolls over the month.

Total weekly pay rolls in January were $31,350,000 larger than in January of last year. All durable-goods groups reported higher total weekly wage payments, and the gains ranged in amounts from $1,060,000 in stone, clay, and glass and $1,460,000 in lumber to $8,710,000 in transportation equipment and $11,470,000 in machinery manufacturing.

NONDURABLE-GOODS INDUSTRIES

Employment.—The number of workers employed in foodstuffs declined 61,600 in January. This reduction combined with decreases of 16,700 in paper and printing, 13,500 in textiles, and 7,500 in tobacco offset the small employment gains recorded in leather, rubber, and chemicals. For all non-durable-goods groups combined, employment was approximately 91,600 lower than in December.

However, compared with January 1940, about 117,200 more workers had jobs in non-durable-goods industries this January. With the exception of leather, which reported a loss of 12,400 workers over the year interval, all non-durable-goods groups of industries had more workers on their pay rolls.

Weekly Pay Rolls.—The aggregate weekly wage income of workers in non-durable-goods industries declined by approximately $3,900,000 in January. The largest pay-roll reductions were $1,900,000 in foodstuffs, $962,000 in textiles, and $845,000 in paper and printing.

All non-durable-goods groups, however, reported larger weekly pay rolls in January 1941 than in January 1940. Outstanding among the increases were advances of $2,250,000 in textiles, $879,000 in chemicals, and $751,000 in paper and printing.

Trend of Employment and Pay Rolls in Manufacturing Industries

Although factory employment showed a seasonal decline of about 1 percent in January, it was nearly 10 percent higher than in the same month of last year. The Bureau of Labor Statistics employment index for all manufacturing industries stood at 115.2 in January, as against 116.2 in December, 105 in January 1940, and 100 for the 3 years 1923–25.

Weekly pay rolls in manufacturing industries were 2 percent smaller than in December but 20 percent larger than in January 1940. The Bureau's pay-roll index shows that for every $1,000 disbursed in weekly wages during 1923–25, factories paid out $1,198 in wages in January, compared with $1,224 in the preceding month and $998 in January of last year.

Factory Pay-Roll Index

1923–25=100

1941	
January	[1] 119.8
1940	
December	122.4
November	116.5
October	116.2
September	111.6
August	105.5
July	98.2
June	99.5
May	97.8
April	97.9
March	99.8
February	99.3
January	99.8

[1] *Preliminary.*

Hours of Work and Earnings in Manufacturing Industries

The average workweek of about 39 hours reported for all manufacturing industries combined in January was slightly shorter than in the preceding month but about an hour and a half longer than in January 1940. Hourly earnings of 69 cents averaged slightly more than in December and 3 cents an hour more than in January a year ago. Average weekly earnings of $27.70 in January were about 25 cents per week smaller than in December, but approximately $2 per week larger than in the corresponding month a year ago.

In the five selected durable- and nondurable-goods manufacturing industries average weekly hours of work and average hourly and weekly earnings in January 1941 were:

Durable-goods manufacturing

Weekly hours:
- 43.0 in foundries and machine shops.
- 39.0 in blast furnaces and rolling mills.
- 39.0 in automobiles.
- 38.5 in sawmills.
- 37.0 in brick manufacturing.

Hourly earnings (in cents):
- 96.5 in automobiles.
- 86.0 in blast furnaces and rolling mills.
- 75.5 in foundries and machine shops.
- 58.5 in brick manufacturing.
- 51.0 in sawmills.

Weekly earnings:
- $37.60 in automobiles.
- $33.65 in blast furnaces and rolling mills.
- $32.50 in foundries and machine shops.
- $21.75 in brick manufacturing.
- $19.60 in sawmills.

Nondurable-goods manufacturing

Weekly hours:
- 41.0 in paper and pulp.
- 39.5 in slaughtering and meat packing.
- 38.0 in tires and inner tubes.
- 37.0 in cotton-goods manufacturing.
- 35.5 in petroleum refining.

Hourly earnings (in cents):
- 97.0 in petroleum refining.
- 95.5 in tires and inner tubes.
- 68.0 in slaughtering and meat packing.
- 66.0 in paper and pulp.
- 42.0 in cotton-goods manufacturing.

Weekly earnings:
- $36.30 in tires and inner tubes.
- $34.45 in petroleum refining.
- $27.00 in paper and pulp.
- $26.85 in slaughtering and meat packing.
- $15.60 in cotton-goods manufacturing.

Employment, Pay Rolls, Wages, and Hours in Selected Nonmanufacturing Industries

Item	January 1941 [1]	Increase or decrease	
		December 1940 to January 1941	January 1940 to January 1941
Retail trade		*Percent*	*Percent*
Employment	3,492,500	−15.6	+4.0
Weekly pay roll	$74,068,000	−13.2	+5.8
Weekly hours	42.5	−.5	−.8
Hourly earnings	$0.54	+4.3	+2.4
Weekly earnings	$21.30	+3.0	+1.8
Wholesale trade			
Employment	1,458,900	−1.7	+.3
Weekly pay roll	$46,483,000	−3.7	+4.2
Weekly hours	40.5	−2.5	−.4
Hourly earnings	$0.76	+.6	+4.7
Weekly earnings	$30.60	−2.1	+3.9
Bituminous coal			
Employment	412,400	−.2	−2.1
Weekly pay roll	$9,584,000	−5.1	−.3
Weekly hours	30.0	−4.0	+2.9
Hourly earnings	$0.88	−1.1	+.4
Weekly earnings	$25.80	−5.0	+1.8
Metal mining			
Employment	79,600	+.5	+9.1
Weekly pay roll	$2,308,000	−3.1	+10.6
Weekly hours	40.5	−3.9	−1.8
Hourly earnings	$0.75	+.3	+3.1
Weekly earnings	$30.20	−3.5	+1.4
Telephone and telegraph			
Employment	403,400	+.4	+5.2
Weekly pay roll	$13,071,000	+.1	+6.4
Weekly hours	40.0	+1.1	+1.8
Hourly earnings	$0.80	−1.8	−1.1
Weekly earnings	$31.80	−.3	+1.1
Power and light			
Employment	248,900	−.7	+1.7
Weekly pay roll	$8,785,000	−.5	+3.8
Weekly hours	39.0	−.1	−1.2
Hourly earnings	$0.91	+.1	+2.9
Weekly earnings	$35.45	+.3	+2.1
Street railways and busses			
Employment	191,400	−.2	−.8
Weekly pay roll	$6,610,000	−2.9	+2.8
Weekly hours	45.5	−3.7	+1.9
Hourly earnings	$0.73	+.3	+1.8
Weekly earnings	$34.00	−2.7	+3.6
Hotels			
Employment	272,000	+.7	+2.0
Weekly pay roll	$4,166,000	−.1	+3.6
Weekly hours	45.5	−.6	−.9
Hourly earnings	$0.34	−.1	+2.5
Weekly earnings	$15.65	−.7	+1.5
Laundries			
Employment	234,100	+.9	+5.4
Weekly pay roll	$3,909,000	+.6	+7.7
Weekly hours	43.0	−.3	+.4
Hourly earnings	$0.43	[2]	+1.6
Weekly earnings	$18.30	−.3	+2.1
Dyeing and cleaning			
Employment	59,300	−2.0	+7.7
Weekly pay roll	$1,061,000	−3.0	+12.2
Weekly hours	42.0	−.8	+5.1
Hourly earnings	$0.49	−.1	−1.1
Weekly earnings	$19.90	−1.0	+4.1

[1] *Preliminary.* [2] *No change.*

Government Employment and Relief in January 1941

Work Projects.—Relief projects of the Work Projects Administration furnished employment to 1,840,000 persons in January at a total pay roll of $101,700,000. Both employment and pay rolls in January were slightly higher than in the previous month but substantially lower than in January 1940.

Construction Projects.—Employment and earnings at the site of construction on Government projects in January were:

Project	Employment	Earnings
All construction projects	913, 700	$110, 560, 000
Regular Federal Government appropriations	785, 700	101, 000, 000
Financed by Work Projects Administration	65, 000	3, 200, 000
United States Housing Authority	42, 000	4, 100, 000
Public Works Administration	18, 000	1, 960, 000
Reconstruction Finance Corporation	3, 000	300, 000

C. C. C. and N. Y. A.—Approximately 298,000 enrolled workers, camp supervisors, and instructors earned $13,330,000 in January in the Civilian Conservation Corps. The National Youth Administration provided jobs for 870,000 boys and girls in January at a total pay roll of $10,730,000.

General Relief.—About 623,300 families and single persons received $18,900,000 in relief from public funds in January, according to reports from 107 urban areas to the Social Security Board.

Federal Service.—Employment and earnings in the Federal Government in January were:

Service	Employment	Earnings
Executive [1]	1, 151, 000	$178, 200, 000
Military	958, 000	59, 500, 000
Legislative	6, 000	1, 300, 000
Judicial	2, 500	640, 000

[1] *Includes about 164,200 force account, supervisory, and technical employees with a total pay roll of $23,100,000 shown under other classifications.*

Cost of Living in February 1941

The total cost of goods purchased by families of wage earners and lower-salaried employees increased somewhat between mid-January and mid-February. Foodstuffs and rents continued to rise slowly, and higher prices also prevailed for many other articles, particularly cotton and woolen products—such as clothing and housefurnishings.

The average cost of clothing to families with moderate incomes was about 1½ percent higher at the end of 1940 than it was before the war broke out in Europe. Although the usual sales in many stores had somewhat reduced prices during January, these went up again as soon as the sales terminated.

The increase in the average cost of clothing does not, however, tell the whole story. The average is made up of a number of items some of which have advanced in price while others declined. For instance, the price of most clothing made of wool and cotton went up considerably more than the average, while the price of other items, such as silk stockings, declined substantially during 1940.

Goods manufactured from wool have gone up in price considerably more than the raw wool, largely because of the Army and Navy needs for certain kinds of fabrics and garments, particularly worsteds. Retail prices of wool blankets rose 14 percent in 1940, and carpets and rugs have gone up 15 percent.

Prices of cotton goods also have risen considerably, even though the price of raw cotton is not much higher now than it was in the summer of 1939. The retail price of work shirts rose 4 percent, and the price of overalls advanced 5 percent since the summer of 1939.

Reduced Quality.—When prices of textiles are rising, manufacturers sometimes substitute inferior material or reduce the amount of material and by this method avoid raising the price of the product. Such a policy is often applied to articles of clothing and housefurnishings which are usually sold at certain generally accepted price levels called "price lines." For example, women's street dresses are generally sold in price lines of $5.95,

$6.95, $7.95, or $10.95. Men's shirts sell at $1, $1.39, $1.65, or $2 each, while men's worsted suits usually retail for $19.75, $25, or $30.

Changes in the quality of an article can be brought about in many ways: Rayon is mixed with wool in making blankets and rugs; cotton is mixed with wool in manufacturing men's sweaters; the grade of yarn used in cloth may be changed, particularly in men's suits; the thread count of a fabric may be reduced. For example, women's inexpensive wash frocks are now being made of a lower thread-count percale, which is, of course, less serviceable. In some cases the materials may be changed entirely. Thus, gabardine, a woven cloth, is being used increasingly for the uppers of women's shoes instead of leather.

Not all of these changes necessarily mean a poorer or less serviceable product. In most cases, however, fiber substitutes, changes in material, and "cutting corners" in workmanship cannot be achieved without reducing the quality and serviceability of the product. Although often not noticed by the consumer, such changes in the quality of the product reduce the living standards of wage earners just as effectively as higher prices or a reduced income resulting from a direct pay cut.

Cost of living in 20 large cities

Area and city	Index as of Feb. 15, 1941 (1935-39=100)	Percentage increase (+) or decrease (−)	
		Jan. 15, 1941, to Feb. 15, 1941	Aug. 15, 1939, to Feb. 15, 1941
Average for 33 cities [1]	100.8	+0.1	+2.2
North Atlantic:			
Boston	99.2	+.3	+2.2
Buffalo	102.0	(2)	+3.6
New York	101.3	+.3	+2.3
Philadelphia	99.2	−.1	+1.4
Pittsburgh	100.8	−.3	+2.4
South Atlantic:			
Baltimore	101.1	+.2	+2.4
Savannah	100.8	−.5	+1.5
North Central:			
Chicago	101.2	(2)	+2.5
Cincinnati	99.6	+.1	+2.4
Cleveland	102.1	+.1	+2.1
Detroit	101.1	+.1	+2.6
Kansas City	98.5	+.3	−.1
Minneapolis	101.8	+.4	+2.1
St. Louis	100.8	(2)	+2.8
South Central:			
Birmingham	100.9	−.1	+2.4
Houston	101.9	(2)	+1.2
Western:			
Denver	99.4	−.2	+.8
Los Angeles	101.8	−1.0	+1.3
San Francisco	102.1	(2)	+2.8
Seattle	102.4	+.3	+2.1

[1] *Estimated.* [2] *No change.*

U. S. GOVERNMENT PRINTING OFFICE: 1941

e (+) or)

15, 1939, to 15, 1941

+2.2

+2.2
+3.6
+2.3
+1.4
+2.4

+2.4
+1.5

+2.5
+2.4
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+2.6
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